STATE OF WISCONSIN

1986

Point Beach

Environmental Radioactivity Survey

NRC 30-83-647



Wisconsin Department of Health and Social Services Division of Health Bureau of Environmental Health Section of Radiation Protection P.O. Box 309 Madison, Wisconsin 53701

8705040325 870427 PDR ADOCK 05000266 R PDR

.

Table of Contents

	Page Number
Introduction	1
Sampling Techniques	1
Analytical Procedures	2
Quality Assurance	4
Sensitivities and Error	5
- Wisconsin DHSS	
Sensitivity - Point Beach	6
Results and Discussion	7
References	16
Table 5 - Sample Summary for 1986	17
Table 6 - EPA Cross Check Results	19

List of Tables - Wisconsin and Point Beach Data

.

.

*

Table	1.	Comparison of yearly log-normal averages for	
		filters composites.	7
Table	2.	Calculated doses to a maximum exposed individ-	
		greater than MDC and background levels.	14
Table	3.	Parameters used in the dose calculations for	
		the Soviet accident at Chernobyl.	15
Table	4.	Calculated doses resulting from radioactive fallout from the Soviet accident at Chernobyl	
		to a maximum exposed individual for Wisconsin	
		samples with activities greater than MDC and	1.5
		background levels.	10
Table	5.	Sample summary for 1986 from the environmental	
		split sample monitoring program conducted by	17
		Wisconsin and Point Beach.	10
Table	6.	EPA Cross Check Results for 1985 and 1986.	10
Table	7.	Air particulate gross beta and air lodine	
		(I-131) results for January - June, 1980.	25
		Indicator site.	20
Table	8.	Air particulate gross beta and air lodine	
		(I-131) results for July - December, 1986.	26
		Indicator site.	20
Table	9.	Air particulate gross beta and air iodine	
		(I-131) results for January - June, 1986.	27
		Control site.	£ 1

List of Tables (continued)

Table	10.	Air particulate gross beta and air iodine	
		(I-131) results for July - December, 1900.	28
Table	11.	Gamma isotopic results for January - December,	
		particulate samples. Indicator site.	29
Table	12.	Gamma isotopic results for January - December,	
		particulate samples. Control site.	30
Table	13	Analysis of surface water samples from	
Table	10.	January - June, 1986. Indicator site.	31
Table	14.	Analysis of surface water samples from	
14010		July - December, 1986. Indicator site.	32
Table	15.	Analysis of surface water samples from	22
		January - June, 1986. Control site.	33
Table	16.	Analysis of surface water samples from	34
		July - December, 1986. Control site.	35
Table	17.	Analysis of fish samples for 1980.	36
Table	18.	Analysis of fish samples for 1980.	37
Table	19.	Analysis of shoreline sediments for 1980.	5.
Table	20.	Analysis of milk samples for January -	38
		December, 1986. Funk farm.	30
Table	21.	Analysis of milk samples for January -	20
		December, 1986. Lehrmann farm.	39
Table	22.	Analysis of vegetation samples for 1986.	40

٠

STATE OF WISCONSIN

1986

POINT BEACH ENVIRONMENTAL RADIOACTIVITY SURVEY

INTRODUCTION

This report is prepared under U.S. Nuclear Regulatory Commission Contract NRC 30-83-647 by the State of Wisconsin, Department of Health and Social Services, Section of Radiation Protection. This report covers the calendar year 1986. Results of environmental radioactivity monitoring are listed in tabular form. The data presented consists of duplicative sample analysis such as air and TLD data and split sample analysis conducted by the state radiation protection laboratory or subcontractor and the licensee. A brief description of sample collection techniques and analytical procedures conducted by the state laboratory is also given. A sample collection summary for 1986 is included in Table 5. The sample summary includes type and number of samples collected, Minimum Detectable Concentrations (MDC's) or Lower Limits of Detection (LLD's) as well as the range of reported activities for each type of sample analysis.

SAMPLING TECHNIQUES

Direct Radiation - Thermoluminescent Dosimeters (TLD's)

Continuous monitoring of direct radiation is performed quarterly using thermoluminescent dosimeters. The dosimeters are placed at 43 locations in the area of the Kewaunee and the Point Beach nuclear power plants.

Air Samples

Continuous air samples are collected weekly from two stations. Air particulate samples are collected on 47 mm. glass fiber filters. Air iodine samples are collected using charcoal absorbers mounted in tandem with the air particulate filters. The nominal sampling rate is 1 - 2.5 cubic feet of air per minute.

Surface Water

A split sample consisting of 3.5 liters of liquid effluent is collected monthly at a point close to the discharge of the Point Beach effluent channel. This sample is a monthly composite of weekly grab samples and is collected while the plant is discharging liquid to the channel. A background surface water sample is also taken at the Green Bay Pumping Station - Rostok, 15.6 miles NNE. A surface water sample from the Coast Guard Station, 4.8 miles SSE, is included as a background sample for Point Beach.

Milk

A raw milk sample is collected monthly from the Lehrmann farm and the W. Funk farm. The milk sample is split between WI DHSS and the Point Beach nuclear power facility.

Sediment

A split sample for shoreline sediment is collected from three locations on an annual basis.

Fish

Split samples of both migratory and non-migratory fish are collected periodically from locations in Lake Michigan near the Point Beach - Kewaunee area.

Food Products

A split sample for vegetation (grass) is collected from several locations in the Point Beach area.

ANALYTICAL PROCEDURES

The procedures given are abstracted to present only the basic steps. The analysis of the samples has been subcontracted to the State Laboratory of Hygiene. A detailed description of the procedures used is available from the State Laboratory of Hygiene.

Air Particulate Samples - Beta Gamma

Place the 47 mm. glass fiber filter on a 2-inch stainless steel planchet. Beta count in an external gas flow proportional counter. Calculate activity correcting for counter efficiency.

Air Particulate Samples - Gamma

The monthly or quarterly composite of air particulate filters is placed on a Ge(Li) detector and the gamma spectrum is collected. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

Surface Water - Alpha, Beta Gamma

Filter a 500 ml. aliquot of sample. Evaporate filtrate in a 2-inch stainless steel planchet. Place filter paper in a 2-inch stainless steel planchet and dry at 103 degrees Celsius. Beta and alpha count the soluble and insoluble portions in an external gas flow proportional counter. Calculate activity correcting for counter efficiency and for self-absorption.

Surface Water - Gamma Isotopic

A 3.5 liter sample is placed in a Marinelli beaker and analyzed on a GeLi detector. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

Surface Water - Iodine 131 Chemical Extraction

A stable iodine carrier is added to a 2 liter sample of raw milk. The sample is passed through an anion exchange column and the iodine is removed from the resin by batch/extraction using NaOC1. After reduction to elemental iodine by hydroxylamine hydrochloride, the iodine is extracted into carbon tetrachlorine reduced with bisulfite, and back extracted into water. The iodine is precipitated as palladous iodide with the chemical yield determined gravimetrically and counted in an external gas flow proportional counter correcting for counter efficiency and for decay.

Vegetation or Food Product - Alpha, Beta and Gamma Isotopic

Dry sample at 110 degrees Celsius, grind, weigh into stainless steel planchet. Beta and alpha count in an external gas flow proportional counter. Calculate activity correcting for self-absorption and counter efficiency.

The food product sample is finely chopped. The sample is packed to the 500 ml mark of a 500 ml Marinelli beaker, weighed and counted for 900 minutes on a Ge(Li) detector. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

Soil or Sediment - Alpha, Beta and Gamma Isotopic

Dry sample at 110 degrees Celsius, grind, and weigh into a stainless steel planchet. Beta and alpha count in an external gas flow proportional counter. Calculate activity correcting for selfabsorption and counter efficiency.

The dried sediment is added to a 500 ml Marinelli beaker, weighed and counted on a Ge(Li) detector. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

Milk - Gamma Isotopic

Procedure same as for Surface Water.

Milk - Iodine 131 Chemical Extraction

Procedure same as for Surface Water.

Fish - Gamma Isotopic

A sample is placed in a 500 ml. Marinelli beaker. Place the sample on a GeLi detector and collect the gamma spectrum. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

Direct Radiation

Thermoluminescent dosimeters are supplied by the U.S. Nuclear Regulatory Commission. The exposed TLD's are shipped to NRC Region I and are read by the Commission.

QUALITY ASSURANCE

The analysis of the samples is performed under subcontract with the State Laboratory of Hygiene (SLH). SLH maintains its own quality assurance program which was also reviewed by the NRC in January, 1985.

Analytical procedures provide for routine replicate analyses to verify methods and instrument operation. Traceable sources are used to regularly calibrate the counters and daily performance checks are made between calibrations. In addition, quality control charts are maintained on the counters.

SLH participates in the EPA Cross Check program. The quality assurance progam that the SLH participates in include analysis of blind samples, air filters, food, milk, gamma in water, alpha-beta in water, iodine in water, strontium in water and tritium in water. The EPA Cross Check code for SLH is "AF". A complete listing of the EPA Cross Check results for 1985 and 1986 is included in Table 6.

SENSITIVITIES AND ERROR - WISCONSIN DHSS

Following the recommendations of the Health Physics Society, detection limits will be expressed as a minimum detectable concentration (MDC). The minimum detectable concentration or MDC is an "a priori" estimate of the capabliity for detecting an activity concentration by a given measurement system, procedure, and type of sample. The MDC should not be viewed as an absolute activity concentration that can or cannot be detected. Minimum detectable concentrations (MDC) are based on the analysis performed and for gamma isotopic analysis have been calculated for a zero decay time. Minimum detectable concentrations (MDC's) are listed in Table 5.

The WI DHSS definition for minimum detectable concentration follows closely the equation for the lower limits of detection as defined in the NRC contract NRC-30-83-647. Activities defined by the equation for MDC will be used in this report.

The MDC for each radioisotope has been calculated from the following equation:



Where:

MDC is the "a priori" lower limit of detection as defined above, as picocuries per unit mass or volume,

sb is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, as counts per minute,

E is the counting efficiency, as counts per disintegration,

V is the sample size in units of mass or volume,

2.22 is the number of disintegrations per minute per picocurie,

Y is the fractional radiochemical yield, when applicable,

S is the self-absorption correction factor,

d is the radioactive decay constant for the particular radionuclide, and

t for environmental samples is the elapsed time between sample collection, or end of the sample collection period, and time of counting. Guidelines adopted by the U.S. Environmental Protection Agency are used in the reporting of specific analyses. Results from specific analyses will be reported whether the results are negative, zero, or positive. Caution should be exercised in the interpretation of individual negative values. While a negative activity value does not have physical significance, it is significant when taken together with other observations which indicate that the true value of a distribution is near zero. This procedure will allow all of the data to be reported and will allow a statistical evaluation without an arbitrary cutoff of small or negative numbers. An estimation of bias in the nuclide analyses is then possible as well as a better evaluation of distributions and trends in the environmental data. It is important when reviewing the data in the following tables to compare the reported result to the actual minimum detectable concentration (MDC) for that analysis.

Results for specific analyses will be reported as an activity followed by an error term for that analysis. The error term is a plus or minus counting error term at the 2 sigma (95%) confidence interval and is printed as (+/-).

SENSITIVITY - POINT BEACH

According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported. Lower limits of detection (LLD's) are included in Table 5.

RESULTS AND DISCUSSION

A sample collection summary for 1986 is included in Table 5. The sample summary includes the type and number of samples collected as well as the range of reported activities for each type of sample analysis. Results from the individual sample analyses are listed in Tables 7-22.

Radioactive fallout resulting from the Soviet accident at Chernobyl was detected in WI DHSS and Point Beach samples collected during the time period of 05/01/86 - 07/01/86. Sample analysis results are discussed in the individual sections and dose calculations are performed in the section <u>Dose to Individuals from Radioactive Fallout</u> from the Soviet Accident at Chernobyl.

Air Particulate

WI DHSS and Point Beach maintain separate air sampling stations. The indicator site for both WI DHSS and for Point Beach is located at the residency at the north property line, 1.3 miles NNW. The control site for WI DHSS is located at the Green Bay Pumping Station - Rostok, 15.6 miles NNE. The control site for Point Beach is located at Silver Lake College, 17 miles WSW.

A summary of reported activities by WI DHSS and Point Beach from air particulate samples is included in Table 5. Results from the individual sample analyses are listed in Tables 7-10.

The yearly averages, from a log-normal distribution, for the gross beta analysis on the air particulate filters are given in Table 1.

The WI DHSS and Point Beach yearly averages for gross beta activity from the air particulate filters are comparable and showed no significant differences between the respective indicator and control sites.

Table 1. Comparison of the yearly averages for gross beta activity from air particulate filters for 1986.

WI - Section of Radiation Protection

units of pCi/M3

Point Beach

Indicator	Control	Indicator	Control
0.015 + 0.002	0.013 ± 0.003	0.02 ± 0.01	0.02 ± 0.01

The elevated gross beta activities for the time period of 05/05/86 -06/12/86 are due to radioactive fallout from the Soviet accident at Chernobyl. Elevated gross beta activities were reported by WI DHSS and Point Beach and were present in samples from both the indicator and the control sites. Elevated gross beta activities were also reported in air particulate samples from the three other WI DHSS environmental monitoring areas.

A summary of reported gamma isotopic activities for WI DHSS and Point Beach from the monthly or quarterly air particulate filter composites is included in Table 5. Results from the individual sample analyses are listed in Tables 11-12.

In the WI DHSS gamma isotopic analysis, beryllium-7 (Be-7) was detected in all composites from both the indicator and the control sites. Beryllium-7 (Be-7) is a naturally occurring radioisotope that is constantly produced through nuclear reactions between cosmic rays and nuclei in the atmosphere. All other radionuclides were below their respective MDC for the 1st, 3rd and 4th quarter composites.

For the 1st, 3rd and 4th quarter composites, Point Beach did not report any activities above their respective LLD. Point Beach does not report naturally occurring radioisotopes and no comparison can be made for the beryllium-7 (Be-7) reported by Wisconsin.

At the observed lower levels of activity the WI DHSS and Point Beach data are comparable in the gamma isotopic analysis of the air particulate samples. Influence by the Point Beach nuclear facility on air quality is not evident when comparing the data from the indicator and control sites.

Radioactive fallout resulting from the Soviet accident at Chernobyl was detected in WI DHSS and Point Beach samples for the time period of 05/05/86 - 06/12/86. The radioisotopes detected in the WI DHSS sample analysis of the May and June monthly composites of air particulate samples were ruthenium-103 (Ru-103), cesium-134 (Cs-134) and cesium-137 (Cs-137). The indicated radioisotopes were detected in both the control and indicator composites and the activities from both sites are listed in Tables 11-12. The indicated radioisotopes were also detected in air particulate composites from the three other WI DHSS environmental monitoring areas within Wisconsin at approximately the same activities.

For the 2nd quarter composites, Point Beach reported activities for ruthenium-103 (Ru-103) and cesium-137 (Cs-137) for both the indicator and the control sites. Activity for cesium-134 (Cs-134) was less than the Point Beach LLD of 0.01 pCi/M^3 .

The WI DHSS and Point Beach data are comparable in the gamma isotopic analysis of the air particulate samples for the 2nd quarter of 1986.

Air Iodine

Air iodine samples are taken at the same sites as the air particulate samples.

A summary of reported air iodine activities for WI DHSS and Point Beach is included in Table 5. Results from the individual sample analyses are listed in Tables 7-10.

All reported WI DHSS and Point Beach air iodine measurements except for the time period of 05/05/86 - 06/12/86 were below the required NRC LLD of 0.07 pCi/M³ for both the indicator and the control sites.

Radioactive fallout from the Soviet accident at Chernobyl was detected in WI DHSS and Point Beach air iodine (I-131) measurements. The weekly air iodine (I-131) activity for the time period of 05/05/86 -06/12/86 was in the range of 0.03 - 0.18 pCi/M³ for WI DHSS and 0.04 -0.52 pCi/M³ for Point Beach. Air iodine (I-131) activity was observed at both the indicator and the control sites for WI DHSS and Point Beach. Elevated air iodine (I-131) activity was also observed in the three other WI DHSS environmental monitoring areas.

Surface Water

Surface water from the effluent channel is a split sample. This sample is a monthly composite of weekly grab samples. Surface water from a control site is not a split sample. WI DHSS collects a monthly grab sample at the Green Bay Pumping Station - Rostok, 15.6 miles NNE. A monthly grab sample is collected by Point Beach at the Coast Guard Station, 4.8 miles SSE.

A summary of reported activities by WI DHSS and Point Beach from the monthly surface water samples is included in Table 5. Results from the individual sample analyses are listed in Tables 13-16.

All reported activities by WI DHSS and Point Beach are at background levels for the samples taken at the control sites. All reported gamma isotopic activities were less than the respective WI DHSS MDC or the respective Point Beach LLD. Gross beta activities reported by WI DHSS and Point Beach were all at background levels for samples collected at the the control sites. The gross beta yearly average for WI DHSS of 3.9 ± 1.5 pCi/liter and for Point Beach of 2.9 ± 0.4 pCi/liter for the control sites are not significantly different from reported yearly average gross beta activities from previous years.

For samples taken at the indicator site, effluent channel, all reported gamma isotopic activities were less than the respective WI DHSS MDC or the respective Point Beach LLD. Tritium (H-3) was detected by WI DHSS in four monthly composites in the range of 1160 -19300 pCi/liter. Point Beach reported tritium (H-3) activities in three guarterly composites in the range of 1660 - 6790 pCi/liter. The WI DHSS and Point Beach activities for tritium (H-3) are comparable when WI DHSS monthly activities were guarterly averaged. WI DHSS reported three iodine-131 (I-131) activities above its MDC of 0.4 pCi/liter. The WI DHSS reported activities for iodine-131 (I-131) were 2.9 ± 1.6 , 2.4 ± 0.6 and 3.6 ± 0.7 pCi/liter. All reported iodine-131 (I-131) activities for Point Beach were less than 0.5 pCi/liter. The gross beta yearly average for WI DHSS of 5.3 ± 1.6 pCi/liter and for Point Beach of 2.2 ± 0.5 pCi/liter is not significantly different from previous years.

All activities reported by either WI DHSS or Point Beach are below the standards for uncontrolled areas specified in ICRP Report No. 2 or 10 CFR 20. Plant influence is not evident after comparing WI DHSS and Point Beach data for the indicator and control sites.

Radioactive fallout from the Soviet accident at Chernobyl was not evident or detectable in surface water samples.

Fish

Split samples were taken for fish. The samples were obtained from the Point Beach pumphouse.

A summary of reported activities by WI DHSS and Point Beach for fish samples is included in Table 5. Results from the individual sample analyses are listed in Tables 17-18.

For WI DHSS, the detected levels of activity for cesium-137 (Cs-137) and for naturally occurring potassium-40 (K-40) were also reported in previous years. For Point Beach only cesium-137 (Cs-137) was detected above its respective lower limit of detection (LLD). Naturally occurring isotopes such as potassium-40 (K-40) are not reported by Point Beach.

At the low level of reported activities the WI DHSS and Point Beach data are comparable.

Radioactive fallout from the Soviet accident at Chernobyl was not evident or detectable in fish samples.

Shoreline Sediments

Split samples were taken for shoreline sediments at three locations.

A summary of reported activities by WI DHSS and Point Beach for shoreline sediment is included in Table 5. Results from the individual sample analyses are listed in Table 19.

From the WI DHSS gamma isotopic analysis, naturally occurring potassium-40 (K-40) and radioisotopes from uranium and thorium decay series were detected in all three samples. Cesium-134 (Cs-134) and cesium-137 (Cs-137) were detected at site E-06 and cobalt-60 (Co-60) was detected at site E-12. All reported activities for cobalt-60 (Co-60), cesium-134 (Cs-134) and cesium-137 (Cs-137) were less than the respective required NRC LLD.

Point Beach analysis did not detect any radioisotopes above their respective LLD and does not report naturally occurring radioisotopes such as potassium-40 (K-40).

Radioactive fallout from the Soviet accident at Chernobyl was not evident or detectable in shoreline sediment samples.

Milk

A split sample is taken for milk. Milk is collected from the Funk farm, 3.8 miles WSW and from the Lehrmann farm, 2.7 miles NNW.

A summary of reported activities by WI DHSS and Point Beach for milk samples is included in Table 5. Results from the individual sample analyses are listed in Tables 20-21.

For WI DHSS naturally occurring potassium-40 (K-40) was detected in all of the samples. Activities for iodine-131 (I-131) were less than the WI DHSS MDC of 0.4 pCi/liter except for the 01/08/86 and 03/12/86 samples from the Funk farm and the 06/05/86 sample from the Lehrmann farm. The 01/08/86 and 03/12/86 reported iodine-131 (I-131) activities from the Funk farm are not statistically different from the reported Point Beach activites of <0.5 pCi/liter and are less than the required NRC LLD of 1.0 pCi/liter. The 06/05/86 reported iodine-131 (I-131) activity from the Lehrmann farm is due to the radioactive fallout from the Soviet accident at Chernobyl and was also reported by Point Beach. Iodine-131 (I-131) was also detected in milk samples from the other WI DHSS environmental monitoring areas. The detected activity for cesium-134 (Cs-134) from the 09/03/86 sample from the Funk farm of 14 pCi/liter is only slightly above the WI DHSS MDC of 12 pCi/liter, was not reported by Point Beach and is less than the required NRC LLD of 15 pCi/liter.

Point Beach did not detect any isotopes above their lower limits of detection in its gamma isotopic analysis. Reported results for iodine-131 (I-131) were less than 0.5 pCi/liter except for the 05/14/86 sample from the Funk farm and the 05/19/86 and 06/05/86 samples from the Lehrmann farm. The 05/14/86 reported iodine-131 (I-131) activity from the Funk farm is not statistically different from the WI DHSS MDC of 0.4 pCi/liter. The 05/19/86 reported iodine-131 (I-131) activity from the Lehrmann farm can not be compared since it was not a split sample. The 06/05/86 reported iodine-131 (I-131) activity from the Lehrmann farm of the compared since it was not a split sample. The 06/05/86 reported iodine-131 (I-131) activity from the Lehrmann farm of the compared since it was not a split sample. The 06/05/86 reported iodine-131 (I-131) activity from the Lehrmann farm of the compared since it was not a split sample. The 06/05/86 reported iodine-131 (I-131) activity from the Lehrmann farm of the compared since it was not a split sample. The 06/05/86 reported iodine-131 (I-131) activity from the Lehrmann farm of the compared with the reported WI DHSS activity. Naturally occurring potassium-40 (K-40) is not reported by Point Beach.

Influence by the Point Beach nuclear facility is not evident after reviewing the WI DHSS and Point Beach data.

Vegetation - Food Products

Point Beach does not sample for food products. A split sample for vegetation was taken at four sites.

A summary of reported activities by WI DHSS and Point Beach for vegetation samples is included in Table 5. Results from the individual sample analyses are listed in Table 22.

In the WI DHSS gamma isotopic analysis naturally occurring potassium-40 (K-40) was detected in all four samples and cesium-137 (Cs-137) in the sample from site E-06. Activities for iodine-131 (I-131) were below the WI DHSS MDC of 60 pCi/kg.

Point Beach does not report naturally occurring radioisotopes. Only cesium-137 (Cs-137) was detected in the sample from site E-06 and was comparable with the WI DHSS reported activity. Activities for iodine-131 (I-131) were below the Point Beach LLD of 80 pCi/kg.

Influence by the Point Beach nuclear facility is not evident after reviewing the data for WI DHSS and Point Beach.

Radioactive fallout from the Soviet accident at Chernobyl was not evident or detectable in the vegetation samples collected at this time.

Dose to Individuals from Gaseous and Liquid Effluents

Dose calculations for gaseous and liquid effluent releases were performed according to the mathematical models illustrated in USNRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I". The doses, listed in Table 2. were calculated for the maximum exposed individual for WI DHSS samples with activities greater than MDC and background levels.

Doses resulting from gaseous and liquid effluent releases are in compliance with 10 CFR Part 50, Appendix I.

Dose to Individuals from Radioactive Fallout from the Soviet Accident at Chernoby

Dose calculations were performed on samples collected after the Soviet accident at Chernobyl. Radioactive fallout was detected in air particulate and air iodine samples during the period of 05/07/86 - 06/12/86, in milk samples during the period of 05/14/86 - 06/30/86 and in vegetation samples collected in early June, 1986.

Air particulate and air iodine reported activities by WI DHSS were uniform over the four environmental monitoring areas within Wisconsin and the average activities from the four areas were used in the dose calculations. Air particulate and air iodine activities returned to and remained at background levels after 06/30/86.

Analysis of vegetation samples collected 06/02/86 from the WI DHSS LACBWR environmental monitoring area had detectable activities for ruthenium-103 (Ru-103), iodine-131 (I-131) and cesium-137 (Cs-137) in

approximately the same proportions as those reported in air particulate composites. Analysis of vegetation samples collected in September and October from the four WI DHSS environmental monitoring areas had no detectable activities for isotopes present during the period of 04/28/86 - 06/30/86.

Ground deposition affected only the milk pathway since food products were not ready for harvest at that time. Milk samples from local farms were collected from the four WI DHSS environmental monitoring areas and pooled milk samples were collected from six major milk cooperatives within Wisconsin. Iodine-131 (I-131) was detected in a majority of the samples at activities ranging from the WI DHSS MDC of 0.4 pCi/liter up to 45 pCi/liter and cesium-137 (Cs-137) was detected in only a couple of samples at activities only slightly above the WI DHSS MDC of 12 pCi/liter.

Dose calculations were performed according to the mathematical models illustrated in USNRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I". The calculated doses represent the dose received during the indicated time period due to radioactive fallout from the Soviet accident at Chernobyl. The doses, listed in Table 4, were calculated for the maximum exposed individual for WI DHSS samples with activities greater than MDC and background levels. The parameters used in the dose calculations are listed in Table 3.

It is important to note that the doses listed in Table 4 are calculated doses for the exposure periods listed in Table 3 and only represent the dose received from exposure to radioactive fallout from the Soviet accident at Chernobyl. From the doses listed in Table 4 it is apparent that the dose to the thyroid is the most important. The thyroid dose is due mainly to the detected activity for iodine-131 (I-131).

The thyroid dose received from air iodine (I-131) is an inhalation dose and was calculated from continuous air sampling. The air iodine (I-131) activity listed in Table 3 is the average activity from four weekly samples.

The thyroid dose from milk is an ingestion dose calculated from detected activities for iodine-131 (I-131) from grab milk samples. Iodine-131 (I-131) for the listed exposure period in Table 3 was detected in milk samples from within Wisconsin at activity levels of <MDC (0.4 pCi/liter) to 45 pCi/liter. One milk sample collected from a local farm by the LACBWR nuclear generating facility had a iodine-131 (I-131) activity of 70 pCi/liter. The activity for iodine-131 (I-131) of 45 pCi/liter listed in Table 3 is probably greater than the average activity detected during the indicated time period but was used for calculation purposes as a worst case possibility.

The activities for iodine-131 (I-131) detected in milk samples is less than the U.S. Food & Drug Administration's (FDA) Preventative Protective Action Guides (PAG's) which would require public health officials to take action to prevent food stuffs from entering commerce if the PAG is exceeded. The FDA PAG's were set up for short-term emergencies such as the Soviet accident at Chernobyl. The FDA Preventative PAG for iodine-131 (I-131) is 15000 pCi/liter for peak activity in milk.

The U.S. Environmental Protection Agency's (EPA) limit for iodine-131 (I-131) in water is 3 pCi/liter. The EPA limit is more protective than the FDA's Preventive PAG for iodine-131 (I-131) but this limit was set up for a lifetime consumption of drinking water. Iodine-131 (I-131) was only detected in milk samples for the time period of 05/14/86 - 06/17/86 and it would be difficult to apply the EPA limit for iodine-131 (I-131) in water.

The U.S. Environmental Protection Agency (EPA) in document 40 CFR 190 restricts the annual exposure of the population from all parts of the nuclear fuel cycle, including nuclear power plant. The EPA restriction for annual exposure is 25 millirems to the whole body or any organ, except for the thyroid for which the limit is 75 millirems.

The Wisconsin limits for permissible levels of radiation exposure from external sources in unrestricted areas is defined in the Wis. Adm. Code section HSS 157.12 which have been taken from U.S. Nuclear Regulatory Commission 10 CFR 20. The exposure limit stated in HSS 157.12 is 500 millirem whole body in any one year.

The calculated doses from radioactive fallout from the Soviet accident at Chernobyl listed in Table 4 are below current state and federal regulations and present little risk to the Wisconsin general public.

Table 2.	Calculated dose	s to a maximu	in exposed maining		
	with activities	greater than	MDC and backgroun	d levels.	

individual for Wisconsin samples

					Maximum	Exposed (mrem/y	ear)
Sample				whole			
type	Description	n	population	pody	bo	ne	thyroid
fish	average of	8	infant		-		
			child	0.035	0.	25	
			teenager	0.091	C,	20	
			adult	0.16	0.	18	
shoreline	10/07/86	E-06	infant				
sediment			child	0.0012			
			teenager	0.0058			
			adult	0.0010			
shoreline	10/07/86	E-12	infant				
			child	0.0011			
			teenager	0.0055			
			adult	0.0010			

14

Table 3. Parameters used in the dose calculations for the Soviet accident at Chernobyl.

Sample type	time period	Iso	tope ivity	1.10 mc	09 Table E-5 odification	Dose type
air particulate	04/28/86-05/31/86	Ru-103 I-131	0.038	pCi/M ³	E-5/12	Inhalation
		Cs-134	0.011			
air particulate	06/01/86-06/30/86	Ru-103	0.012	pCi/M ³	E-5/12	Inhalation
		Cs-137	0.009			
air iodine milk	05/07/86-06/04/86 05/14/86-06/17/86	I-131 I-131	0.11 45	pCi/l	E-5/12 E-5/12	Innalation

Table 4. Calculated doses resulting from radioactive fallout from the Soviet accident at Chernobyl to a maximum exposed individual for Wisconsin samples with activities greater than MDC and background levels.

				Maximum Exposed : (mrem/exposure	period)
Sample type	Description	population	whole body	bone	thryoid
air	air particulate	infant	0.0002	0.0017	0.037
Gat	04/28/86-05/31/86	child	0.0006	0.0028	0.041
	04/20/00 00/01/01	teenager	0.0013	0.0021	0.037
		adult	0.0008	0.0015	0.030
ain	air particulate	infant	0.0001	0.0005	
all	06/01/86-06/30/86	child	0.0002	0.0009	
		teenager	0.0004	0.0007	
		adult	0.0003	0.0005	
air	air indine	infant	0.0002	0.0003	0.14
all	05/07/86-06/04/86	child	0.0002	0.0004	0.15
	00/01/00 00/01/00	teenager	0.0002	0.0003	0.13
		adult	0.0002	0.0002	0.11
mille	05/14/86-06/17/86	infant	0.034	0.25	17.2
mitk	00/14/00 00/11/00	child	0.030	0.15	7.1
		teenager	0.031	0.06	3.6
		adult	0.030	0.03	2.3

15

References

Food and Drug Administration, Background for Protective Action Recommendations: Accidental Radioactive Contamination of Food and Animal Feeds, HHS Publication FDA 82-8196, August, 1982.

Radiation Protection Standards, Federal Radiation Council, Report No. 2, September 1961.

U.S. Environmental Protection Agency, Environmental Radiation Protection Requirements for Normal Operations of Activities in the Uranium Fuel Cycle, 40 CFR 190, November, 1976.

U.S. Environmental Protection Agency, Upgrading Environmental Radiation Data, Health Physics Society Committee Report HPSR-1 (1980), EPA 520/1-80-012, August 1980.

U.S. Nuclear Regulatory Commission, Title 10, Part 20.

Table 5. Sample summary for 1986 from the environmental split sample monitoring program conducted by WI DHSS and Point Beach.

WI DHSS data					Point Beach data					
Sample type	1	Number of	s*a			1		Number of	s*a	
(units)	MDC	Samples	Analysis	re	ange	i	LLD	Samples	Analysis	range
air particulate	0.003	99/97	gross beta	0.002	- 0.197	1	0.01	104/97	gross bet	a <0.01 - 0.18
(pCi/M^3)		12	gamma isoto	pic		1		8	gamma isot	opic
	0.025	12/12	8e-7	0.058	- 0.11	1			8e-7	analysis not required
	0.007	12/0	Zr-95	-0.001	- 0.003	1			Zr-95	analysis not required
	0.004	12/6	Ru-103	-0.001	- 0.028	1		8/2	Ru-103	<lld -="" 0.01<="" td=""></lld>
	0.015	12/0	Ru-106	-0.001	- 0.009	1			Ru-106	analysis not required
	0.002	12/6	Cs-134	0.000	- 0.012	1	0.01	8/0	Cs-134	<0.01
	0.002	12/6	Cs-137	0.000	- 0.027	1	0.01	8/2	Cs-137	<0.01 - 0.02
	0.006	12/0	Ce-141	-0.001	- 0.002	1			Ce-141	analysis not required
	0.009	12/0	Ce-144	-0.002	- 0.005	1			Ce-144	analysis not required
air iodine (pCi/M ³)	0.045	100/6	I-131	-0.06	- 0.18	1	0.03	104/6	I-131	<0.03 - 0.52
surface water	1.6	24/24	gross beta	2.2	- 21.8	1	1.0	24/23	gross beta	<0.5 - 4.9
(pCi/liter)	750	24/4	H-3	-310	- 19300	1	500	8/3	H-3	<500 - 6790
	0.4	24/3	I-131	-3.5	- 3.6	1	0.5	24/0	I-131	<0.5
		24	gamma isotop	oic		1		24	gamma isot	topic
	9	24/0	Mn-54	-5	- 2	1	10	24/0	Mn-54	<10
	20	24/0	Fe-59	-2	- 9	1	30	24/0	Fe-59	<30
	13	24/0	Co-58	-3	- 4	1	10	24/0	Co-58	<10
	11	24/0	Co-60	-5	- 2	1	10	24/0	Co-60	<10
	22	24/0	Zn-65	-14	- 12	1	30	24/0	Zn-65	<30
	13	24/0	Cs-134	-3	- 13	1	10	24/0	Cs-134	<10
	12	24/0	Cs-137	-4	- 4	1	10	24/0	Cs-137	<10
	15	24/0	Zr-95	-24	- 8	1	15	24/0	Zr-95	<15
	15	24/0	8a-140	-10	- 5	1	15	24/0	Ba-140	<15
fich		8	gamma isoto:	oic		1		12	gamma isot	topic
(pCi/kg wet)	550	8/8	K-40	2300	- 3600	1		12	K-40	analysis not required
(40	8/0	Mn-54	-13	- 13	i	130	12/0	Mn-54	<130
	120	8/0	Fe-59	-15	- 20	1	260	12/0	Fe-59	<260
	54	8/0	Co-58	-2	- 15	1	130	12/0	Co-58	<130
	50	8/0	Co-60	-1	- 30	i	130	12/0	Co-60	<130
	100	8/0	Zn-65	3	- 70	i	260	12/0	Zn-65	<260
	45	8/0	Cs-134	-4	- 23	i	130	12/0	Cs-134	<130
	55	8/8	Cs-137	50	- 150	i	150	12/3	Cs-137	<150 - 260

				WI DHSS data				Point Beach data				
· · · · · ·			Number of	*a			1		Number of	*a		
Sample type	-	MAG	Caseler of	Analucia			i	LLD	Samples	Analysis	range	
(units)	1	MUC	Samp es	Andrysis	10	Ae	1					
abaralina		740	3/3	aross beta	9000	- 14000	1		3/3	gross beta	5700 - 20300	
snoreinne		140	3	gamma isotor	nic		i		3	gamma isot	copic	
sealments		70	2/0	Co-58	13	- 50	i			Co-58	analysis not required	
(pci/kg ary)		00	3/0	Co-60	15	- 120	i			Co-60	analysis not required	
		90	3/1	Ce-134	30	- 150	i			Cs-134	analysis not required	
		00	3/1	Ce-137	18	- 90	i	150	3/0	Cs-137	<150	
		400	3/1	K-40	1000	- 5900	1			K-40	analysis not required	
		400	3/3	P== 226	460	- 2800	i			Ra-226	analysis not required	
		100	3/3	Rd-220	200	- 2560	1			Pb-214	analysis not required	
		180	3/3	PD-214	440	- 2670	1			B1-214	analysis not required	
		200	3/3	81-214	940	- 2010	1			T1-208	analysis not required	
		300	3/2	11-208	290	- 2420	1			Ac-228	analysis not required	
		320	3/3	AC-228	300	- 2000	1					
-114		0.4	24/3	1-131	-0.17	- 0.63	1	0.5	24/3	I-131	<0.5 - 21.4	
(ari/liter)			24	gamma isoto	pic		1		24	gamma iso	topic	
(per/ricer/		120	24/24	K-40	1250	- 1600	i			K-40	analysis not required	
		12	24/1	Cs-134	-2	- 14	i	5	24/0	Cs-134	<5	
		12	24/0	Ce-137	-1	- 10	i	5	24/1	Cs-137	<5 - 5.2	
		15	24/0	Ba-140	-14	- 4	i	5	24/0	8a-140	<5	
					6000	- 0400			4/4	oross bet	a 5900 - 7400	
vegetation		740	4/4	gross beta	0900	3400	1		4	gamma iso	topic	
(pCi/kg wet)			4	gamma isoto	2500	- 5500	1			Be-7	analysis not required	
		1100	4/4	Be-1	2000	- 2000	-			K-40	analysis not required	
		600	4/4	N-40	4/00	- 1000	1			Co-58	analysis not required	
		50	4/0	0-58	-100		1			Co-50	analysis not required	
		55	4/0	0-60	-100	- 0	1			795	analysis not required	
		80	4/0	20-95	-20	- (-()	-	60	1/0	1-131	<60	
		60	4/0	1-131	-19	- 4	-	60	4/0	Ce-134	<60	
		50	4/0	Cs-134	-10	- 24	-	00	4/0	Ca-132	200 - 100	
		60	4/1	Ce-137	-13	- 145	1	80	4/	US=13/	100 - 130	

* a - Number of samples / number of analyses detected above MOC or LLD.

18

Type	Collected	Analysis	SLH result +/- 1 sigma	EPA result 1 +/- 1 sigma	Deviation Known
Water	01-04-85	Sr-89	<1	3+/-5	0.8
		Sr-90	31+/-2	30+/-1.5	0.0
Water	01-18-85	Alpha	4+/-2	5+/-5	-0.3
		Beta	20+/-2	15+/-5	1.6
Food	01-25-85	Sr-89 No	data provided	34.0+/-5.0	
		Sr-90 No	data provided	26.0+/-1.5	
		I-131	33+/-6	35+/-6	-0.4
		Cs-137	30+/-6	29+/-5	0.2
		K	1290+/-90	1382+/-120	0.9
Water	02-08-85	Cr-51	53+/-18	43+/-5	1.8
macer		Co-60	18+/-5	20+/-5	-0.7
		Zn-65	59+/-5	55+/-5	1.4
		Ru-106	31+/-5	25+/-5	2.0
		Cs-134	35+/-5	35+/-5	0.0
		Cs-137	25+/-5	25+/-5	0.1
Water	02-15-85	H-3	3927+/-330	3796+/-366	0.6
Milk	03-01-85	I-131	9+/-1.0	9+/-0.9	0.6
Water	03-15-85	Ra-226	4.3+/-0.8	5.0+/-0.75	-1.6
nacer		Ra-228	7.8+/-1.4	9.0+/-1.35	-1.6
Water	03-22-85	Alpha	6+/-3	6+/-5	0.0
nu cor		Beta	15+/-2	15+/-5	-0.1
Filter	03-29-85	Alpha	12.7+/-4	10.0+/-5.0	0.9
		Beta	33+/-4	36.0+/-5.0	-1.0
		Sr-90	15+/-2	15.0+/-1.5	0.0
		Cs-137	9.3+/-4	6.0+/-5.0	1.1
Water	04-05-85	I-131	8.0+/-1.0	7.5+/-0.8	1.1
Water	04-12-85	H-3	3480+/-350	3559+/-364	-0.4

Table 6. U.S. Environmental Protection Agency's crosscheck program, comparision of EPA and State Laboratory of Hygiene (SLH) results.

Sample	Date	Analysis	Concentr SLH result	EPA result	ample *a Deviation
Type	Collected		+/- 1 sigma	+/- 1 sigma	Known
Water	04-19-85	Alpha	34.7+/-3	32.0+/-5.0	0.9
Mater	04 10 00	Beta	75.3+/-5	72.0+/-5.0	1.2
		Ra-226	6.9+/-0.6	4.1+/-0.6	8.2
		Ra-228	12.0+/-0.9	6.2+/-0.9	11.1
		U N	lo data provide	ed 7.0+/-6.0	
		Sr-89	13.3+/-5	10.0+/-5.0	1.2
		Sr-90	12.7+/-1.5	15.0+/-1.5	-2.3
		Co-60	14+/-4	15.0+/-5.0	-0.3
		Cs-134	12+/-4	15.0+/-5.0	-1.0
		Cs-137	10.7+/-4	12.0+/-5.0	-0.5
Water	05-10-85	Sr-90	15.3+/-1.2	15.0+/-1.5	0.4
		Sr-89	39.0+/-1.5	39.0+/-5.0	0.0
		Alaba	11 7+/-2	12.0+/-5.0	-0.1
Water +	05-24-65	Beta	13.7+/-1.8	11.0+/-5.0	0.9
Water	06-07-85	Cr-51	52+/-8	44.0+/-5.0	2.9
nater		Co-60	13+/-2	14.0+/-5.0	-0.2
		Zn-65	50+/-6	47.0+/-5.0	1.2
		Ru-106	57+/-19	62.0+/-5.0	-1.6
		Cs-134	36+/-3	35.0+/-5.0	0.2
		Cs-137	19+/-3	20.0+/-5.0	-0.2
Water	06-14-85	H-3	2200+/-320	2416+/-351	-1.1
Water	06-21-85	Ra-226	3.2+/-0.5	3.1+/-0.4	0.3
Mater	00 21 00	Ra-228	5.2+/-0.6	4.2+/-0.6	2.7
Milk	06-28-85	Sr-89 N	lo data provide	ed 11.0+/-5.0	
		Sr-90	14+/-2	11.0+/-1.5	3.9
		I-131	12+/-5	11.0+/-6.0	0.3
		Cs-137	11+/-5	11.0+/-5.0	-0.1
		K	1660+/-120	1525+/-76	3.1
Water	07-19-85	Alpha	10.7+/-1.5	11.0+/-5.0	0.6
		Beta	10.0+/-1.5	8.0+/-5.0	0.7
Food	07-26-85	Sr-89 M	lo data provide	ed 33.0+/-5.0	
		Sr-90 M	lo data provide	ed 26.0+/-1.5	
		I-131	32+/-8	35.0+/-6.0	-0.9
		Cs-137	28+/-8	29.0+/-5.0	-0.2
		K	1560+/-100	1514+/-76	1.0
Water	08-09-85	I-131	29+/-10	33.0+/-6.0	-1.3

.

Sample	Date	Analysis	Concentra SLH result	tion in pCi/sa EPA result D	ample *a Deviation
Туре	Collected		+/- 1 sigma	+/- 1 sigma	Known
Water	08-14-85	H-3	4453+/-360	4480+/-448	-0.1
Water	08-23-85	U	5+/-5	4.0+/-6.0	0.3
Filter	08-30-85	Alpha	15.3+/-1.5	13.0+/-5.0	0.8
		Beta	41.0+/-1.5	44.0+/-5.0	-1.0
		Sr-90	19.0+/-1.5	18.0+/-1.5	1.2
		Cs-137	7.7+/-4	8.0+/-5.0	-0.1
Water	09-06-85	Sr-89	23+/-2	20.0+/-5.0	1.2
		Sr-90	6.0+/-1.5	7.0+/-1.5	-1.2
Water	09-13-85	Ra-226	8.7+/-1.3	8.9+/-1.3	-0.3
		Ra-228	3.4+/-0.8	4.6+/-0.7	-2.9
Water	09-20-85	Alpha	7.3+/-1.7	8.0+/-5.0	-0.2
		Beta	10.0+/-1.7	8.0+ -5.0	0.7
Water	10-04-85	Cr-51	<44.	21.0+/-5.0	
		Co-60	19+/-5	20.0+/-5.0	-0.3
		Zn-65	21+/-5	19.0+/-5.0	0.8
		Ru-106	<40	20.0+/-5.0	
		Cs-134	16+/-5	20.0+/-5.0	-1.3
		Cs-137	19+/-5	20.0+/-5.0	-0.2
Water	10-11-85	H-3	1823+/-320	1974+/-345	-0.8
Blind	10-21-85	Alpha	44+/-2	52.0+/-13.0	-1.0
		Beta	76+/-2	75.0+/-5.0	0.3
		Ra-226	5.7+/-0.8	6.30+/-0.95	-1.1
		Ra-228	13.1+/-1.2	10.10+/-1.52	3.4
		U (nat)	10+/-5	8.0+/-6.0	0.5
		Sr-89	29+/-2	27.0+/-5.0	0.8
		Sr-90	8.7+/-1.5	9.0+/-1.5	-0.4
		Co-60	18+/-2	18.0+/-5.0	-0.1
		Cs-134 Cs-137	15+/-5	18.0+/-5.0	0.2
		6	data provided	48.0+/-5.0	
WITK	10-25-85	ST-89 NO	30.7+/-1.8	26.0+/-1.5	5.4
		T-131	41+/-5	42.0+/-6.0	-0.2
		C=137	56+/-5	56.0+/-5.0	0.1
		K	1630+/-180	1540.+/-77.0	2.0
Water	11-22-85	Alpha	11.3+/-1.8	10.0+/-5.0	0.5
Hu COL		Beta	17.0+/-1.5	13.0+/-5.0	1.4

Sample Type	Date Collected	Analysis	Concentra SLH result +/- 1 sigma	tion in pCi/s EPA result +/- 1 sigma	<u>sample</u> *a Deviation Known
Water	12-06-85	I-131	46+/-5	45.0+/-6.0	0.2
	10-12-85	Ra-226	6.7+/-1.0	7.10+/-1.07	-0.7
Water	12-13-05	Ra-228	8.9+/-1.1	7.30+/-1.10	2.6
Water	01-10-86	Sr-89	32.0+/-1.2	31.0+/-5.0	0.3
water	01-10-00	Sr-90	13.3+/-0.7	15.0+/-1.5	-1.9
Water	01-24-86	Alpha	4.0+/-1.4	3.0+/-5.0	0.3
water	0	Beta	7.3+/-1.4	7.0+/-5.0	0.1
Food	01-31-86	Sr-89	No data provided	1 25.0+/-5.0	
rood	01 01 00	Sr-90	No data provided	10.0+/-1.5	
		I-131	19+/-9	20.0+/-6.0	-0.2
		Cs-137	18+/-8	15.0+/-5.0	0.9
		K	1030+/-170	950+/-143	1.0
Water	02-07-86	Cr-51	LT 40	38.0+/-5.0	
na co.		Co-60	17+/-3	18.0+/-5.0	-0.2
		Zn-65	38+/-6	40.0+/-5.0	-0.6
		Ru-106	LT 31	0.0+/-5.0	
		Cs-134	28+/-3	30.0+/-5.0	-0.6
		Cs-137	23+/-3	22.0+/-5.0	0.5
Water	02-14-86	H-3	4913+/-370	5227+/-523	-1-0
Water	02-21-86	U (nat)	10+/-5	9.0+/-6.0	0.4
Water	02-28-86	I-131	9.0+/-1.0	9.0+/-6.0	0.0
	02-14-96	Ra-226	3.9+/-0.5	4.1+/-0.6	-0.7
water	03-14-00	Ra-228	11.9+/-1.8	12.4+/-1.9	-0.4
Water	03-21-86	Alpha	15.7+/-1.5	15.0+/-5.0	0.2
nacer		Beta	10.3+/-1.3	8.0+/-5.0	0.8
Water	04-04-86	I-131	8.0+/-1.5	9.0+/-6.0	-0.3
Filter	04-25-86	Alpha	19.0+/-1.5	15.0+/-5.0	1.4
		Beta	47+/-2	47.0+/-5.0	0.1
		Sr-90	17.0+/-1.5	18.0+/-1.5	-1.2
		Cs-137	11.7+/-3	10.0+/-5)	0.6

Sample Type	Date Collected	Analysis	SLH result +/- 1 sigma	EPA result +/- 1 sigma	sample *a Deviation Known
Blind	04-20-86	Alpha	14+/-2	17.0+/-5.0	-0.9
Diting		Beta	33+/-3	35.0+/-5.0	-0.7
		Ra-226	3.1+/-0.4	2.90+/-0.44	0.7
		Ra-228	2.1+/-0.3	2.00+/-0.30	0.8
		U (nat)	3.7+/-5.0	5.0+/-6.0	-0.4
		Sr-89	6.7+/-0.9	7.0+/-5.0	-0.1
		Sr-90	6.0+/-0.7	7.0+/-1.5	-1.2
		Co-60	10+/-3	10.0+/-5.0	-0.1
		C5-134	4+/-2	5.0+/-5.0	-0.3
		Cs-137	5+/-2	5.0+/-5.0	0.0
Water	05-09-86	Sr-89	5.0+/-2	5.0+/-5.0	0.0
Hate.	00 00 00	Sr-90	5.0+/-1.5	5.0+/-1.5	0.0
Water	07-06-86	Cr-51	<38	0.0+/-5.0	
marces		Co-60	65+/-5	66.0+/-5.0	-0.5
		Zn-65	86+/-5	86.0+/-5.0	0.0
		Ru-106	47+/-5	50.0+/-5.0	-0.9
		Cs-134	45+/-5	49.0+/-5.0	-1.4
		Cs-137	8+/-5	10.0+/-5.0	-0.7
Water	06-20-86	Ra-226	7.3+/-1.3	8.6+/-1.3	-1.7
mater		Ra-228	12.2+/-2.5	16.7+/-2.5	-3.1
Milk	06-27-86	Sr-89	No data provid	ed 0.0+/-5.0	
		Sr-90	16.6+/-1.7	16.0+/-1.5	0.8
		I-131	39+/-5	41.0+/-6.0	-0.5
		Cs-137	38+/-5	31.0+/-5.0	2.4
		K	1660+/-120	1600+/-80	1.4
Water	07-18-86	Alpha	8+/-2	6.0+/-5.0	0.7
		Beta	18+/-2	18.0+/-5.0	-0.7
Food	07-25-86	Sr-89	No data provid	ed 30+/-5	
		Sr-90	No data provid	ed 19+/-1.5	
		I-131	24+/-5	30.0+/-6.0	-1.6
		Cs-137	21+/-5	20.0+/-5.0	0.2
		К	1180+/-120	1150+/-58	0.9
Water	08-08-86	I-131	41+/-10	45.0+/-6.0	-1.2
Water	08-22-86	U (Nat)	4+/-4	4.0+/-6.0	0.1
Water	09-12-86	Ra-226	6.5+/-0.9	6.1+/-0.9	0.8
		Pa-228	10.3+/-1.5	9.1+/-1.4	1.5

Sample Type	Date Collected	Analysis	SLH result +/- 1 sigma	EPA result +/- 1 sigma	ample *a Deviation Known
Filter	09-12-86	Alpha	20+/-2	22.0+/-5.0	-0.7
Farcer	00 12 00	Beta	67+/-2	66.0+/-5.0	0.3
		Sr-90	21.3+/-1.8	22.0+/-1.5	-0.8
		Cs-137	28+/-5	22.0+/-5.0	2.0
Water	00-10-86	Alpha	11.3+/-2	15.0+/-5.0	-1.3
water	09-19-00	Beta	8.7+/-1.5	8.0+/-5.0	0.2
Water	10-10-86	Cr-51	61+/-10	59.0+/-5.0	0.6
water	10-10-00	Co-60	32+/-5	31.0+/-5.0	0.2
		Zn-65	88+/-5	85.0+/-5.0	1.0
		Ru-106	68+/-5	74.0+/-5.0	-2.2
		Cs-134	29+/-5	28.0+/-5.0	0.3
		Cs-137	46+/-5	44.0+/-5.0	0.6
Water	10-17-86	H-3	5300+/-300	5973+/-597	-2.0
Water	11-21-86	Alpha	16+/-2	20.0+/-5.0	-1.4
Harer		Beta	23.7+/-2	20.0+/-5.0	1.3

* a - pCi/sample refers to the following:

Sample	Units
water	pCi/liter except for K mg/liter
food	pCi/kg except for K mg/kg
filter	pCi/filter

24

Table 7. Air particulate gross beta and air iodine (I-131) results for January - June, 1986. Indicator site.

WISCONSIN DIVISION OF HEALTH SECTION OF RADIATION PROTECTION

Point Beach 1986

_____ -------

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

Point Beach data

North Property LiNorth Property Li 1.3 miles NNW

North Property Line 1.3 miles NNW

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01/08/85	0.010+/-0.001	-0.004+/-0.016	01/06/88	0.02	<0.03
01/15/86	0.012+/-0.001	0.000+/-0.03	01/13/86	0.02	<0.03
01/24/86	0.016+/-0.001	0.000+/-0.015	01/20/85	0.02	<0.03
01/29/85	0.017+/-0.002	0.016+/-0.03	01/27/85	0.02	<0.03
02/05/86	0.016+/-0.002	0.003+/-0.02	02/03/86	0.02	<0.03
02/13/88	0.013+/-0.001	-0.004+/-0.012	02/10/86	0.02	<0.03
02/19/86	0.021+/-0.002	-0.002+/-0.03	02/17/86	0.03	<0.03
02/25/85	0.015+/-0.001	-0.004+/-0.03	02/24/86	0.02	<0.03
03/06/85	0.012+/-0.001	-0.005+/-0.03	03/03/86	0.02	<0.03
03/12/85	0.015+/-0.002	-0.001+/-0.014	03/10/86	<0.01	<0.03
			03/17/86	0.02	<0.03
03/25/86	0.012+/-0.001	-0.001+/-0.03	03/24/85	0.02	<0.03
04/02/85	0.014+/-0.001	0.013+/-0.03	03/31/86	0.02	<0.03
04/10/86	0.009+/-0.001	-0.003+/-0.02	04/07/86	0.01	<0.03
04/17/86	0.005+/-0.001	-0.001+/-0.03	24/14/86	0.01	<0.03
04/25/86	0.015+/-0.001	-0.003+/-0.03	04/21/86	0.01	<0.03
05/01/86	0.014+/-0.002	0.005+/-0 02	04/28/85	0.02	<0.0
05/08/86	0.132+/-0.004	0.003+/-0.03	05/05/86	0.02	<0.03
05/14/86	0.145+/-0.004	0.18+/-0.04	05/12/86	0.07	0.0
05/21/86	0.1.1+/-0.004	0.12+/-0.03	05/19/86	0.18	0.5
05/29/86	0.1.8+/-0.003	0.05+/-0.03	05/27/86	0.15	C.1
05/04/85	0.197+/-0.005	0.04+/-0.04	06/02/86	0.17	0.1
06/12/85	0.028+/-0.002	0.02+/-0.03	06/09/86	0.18	<0.0
06/19/86	0.002+/-0.001	-0.02+/-0.03	06/16/86	0.02	<0.0
06/26/85	0.011+/-0.001	0.002+/-0.03	06/23/86	0.03	<0.0
07/02/85	0.009+/-0.002	0.004+/-0.02	06/30/85	0.01	<0.0

Table 8. Air particulate gross beta and air iodine (I-131) results for July - December, 1986. Indicator site.

WISCONSIN DIVISION OF HEALTH SECTION OF RADIATION PROTECTION Point Beach 1986

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

Point Beach data

North Property Line 1.3 miles NNW

Collection date	Air Particulate	Air Iodine
07/10/85	0.013+/-0.001	0.009+/-0.03
07/14/86	0.010+/-0.002	-0.007+/-0.03
07/24/86	0.012+/-0.001	-0.012+/-0.03
07/30/86	0.009+/-0.002	-0.02+/-0.03
08/05/85	0.014+/-0.001	0.002+/-0.018
08/15/86	0.016+/-0.001	-0.003+/-0.03
08/27/86	0.015+/-0.001	-0.001+/-0.02
09/03/86	0.024+/-0.002	0.003+/-0.018
09/18/85	0.011+/-0.001	0.013+/-0.03
09/25/86	0.011+/-0.001	-0.004+/-0.03
10/02/85	0.012+/-0.001	0.006+/-0.03
10/08/85	0.009+/-0.001	-0.009+/-0.03
10/17/86	0.009+/-0.001	-0.04+/-0.03
10/22/86	0.022+/-0.002	-0.06+/-0.04
10/30/86	0.022+/-0.002	0.010+/-0.04
11/05/86	* 8	-0.013+/-0.03
11/14/86	0.016+/-0.001	0.008+/-0.016
11/19/86	0.020+/-0.002	0.012+/-0.02
11/26/86	0.016+/-0.002	-0.03+/-0.04
12/03/86	0.015+/-0.001	-0.004+/-0.03
12/11/86	0.015+/-0.001	-0.002+/-0.03
12/17/86	0.025+/-0.002	-0.004+/-0.03
12/23/86	0.019+/-0.002	-0.002+/-0.02
12/31/86	0.026+/-0.002	0.011+/-0.04

North Property Line 1.3 miles NNW

Colle	tion date	Air Particulate	Air Iodine
07/07	/85	0.02+/-0.01	<0.03
07/14	/86	0.01+/-0.01	<0.03
07/21	/86	0.01+/-0.01	<0.03
07/28	/86	0.02+/-0.01	<0.03
08/04	/86	0.01+/-0.01	<0.03
08/11	/85	0.02+/-0.01	<0.03
08/18	/86	0.02+/-0.01	<0.03
08/25	/86	0.02+/-0.01	<0.03
09/02	/85	0.02+/-0.01	<0.03
09/08	/86	0.02+/-0.01	<0.03
09/15	/85	0.01+/-0.01	<0.03
09/22	/86	0.01+/-0.01	<0.03
09/29	/86	0.02+/-0.01	<0.03
10/07	/86	0.02+/-0.01	<0.03
10/13	/86	0.02+/-0.01	<0.03
10/20	/86	0.01+/-0.01	<0.03
10/27	/86	0.04+/-0.01	<0.0
11/03	/85	0.03+/-0.01	<0.0
11/10	/85	0.02+/-0.01	<0.0
11/12	/86	0.03+/-0.01	<0.0
11/24	/86	0.03+/-0.01	<0.0
12/01	/85	0.03+/-0.01	<0.0
12/08	/85	0.02+/-0.01	<0.0
12/15	/85	0.03+/-0.01	<0.0
12/22	/85	0.04+/-0.01	<0.0
12/2	8/86	0.05+/-0.01	<0.0

* a - Air filter was reported lost in the field.

06/27/86

07/03/86

Table 9. Air particulate gross beta and air iodine (I-131) results for January - June, 1986. Control site.

Point Beach WISCONSIN DIVISION OF HEALTH SECTION OF RADIATION PROTECTION 1986

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

Point Beach data

Green Bay Pumping Station - Rostok 15.6 miles NNE

Collection date	Air Particulate	Air Iodine	
01/10/86	0.013+/-0.001	-0.004+/-0.017	
01/17/85	0.013+/-0.001	0.005+/-0.03	
01/24/86	0.015+/-0.001	0.000+/-0.03	
01/31/86	0.016+/-0.001	0.006+/-0.03	
02/07/86 *a	0.002+/-0.005	0.018+/-0.09	
02/14/86	0.016+/-0.001	0.000+/-0.03	
02/28/86	0.015+/-0.001	-0.005+/-0.011	
03/07/86	0.012+/-0.001	0.016+/-0.03	
03/14/86	0.011+/-0.001	0.02+/-0.03	
03/21/86 *a	0.003+/-0.005	-0.03+/-0.12	
03/27/86	0.011+/-0.001	0.012+/-0.03	
04/04/85	0.011+/-0.001	-0.005+/-0.03	
04/11/85	0.008+/-0.001	0.007+/-0.03	
04/18/85	0.006+/-0.001	-0.003+/-0.017	
04/25/86	0.013+/-0.001	-0.003+/-0.017	
05/02/86	0.014+/-0.001	-0.009+/-0.016	
05/09/86	0.015+/-0.001	0.006+/-0.03	
05/16/85	0.130+/-0.004	0.14+/-0.04	
05/23/86	0.156+/-0.004	0.12+/-0.04	
05/30/86	0.082+/-0.003	0.03+/-0.02	
05/05/86	0.155+/-0.004	0.03+/-0.03	
06/13/86	0.029+/-0.002	0.012+/-0.03	
06/20/86	0.013+/-0.001	-0.002+/-0.03	

Silver Lake College 17 miles WSW

r Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
0.013+/-0.001	-0.004+/-0.017	01/06/86	0.02	<0.03
0.013+/-0.001	0.005+/-0.03	01/13/86	0.01	<0.03
0.015+/-0.001	0.000+/-0.03	01/20/86	0.01	<0.03
0.016+/-0.001	0.006+/-0.03	01/27/86	0.03	<0.03
0.002+/-0.005	0.018+/-0.09	02/03/86	0.02	<0.03
0.016+/-0.001	0.000+/-0.03	02/10/86	0.02	<0.03
0.015+/-0.001	-0.006+/-0.011	02/17/86	0.03	<0.03
0.012+/-0.001	0.016+/-0.03	02/24/86	0.02	<0.03
0.011+/-0.001	0.02+/-0.03	03/03/86	<0.01	<0.03
0.003+/-0.005	-0.03+/-0.12	03/10/86	0.01	<0.03
0.011+/-0.001	0.012+/-0.03	03/17/86	<0.01	<0.03
0.011+/-0.001	-0.005+/-0.03	03/24/86	0.01	<0.03
0.008+/-0.001	0.007+/-0.03	03/31/86	0.02	<0.03
0.006+/-0.001	-0.003+/-0.017	04/07/86	0.01	<0.03
0.013+/-0.001	-0.003+/-0.017	04/14/86	0.01	<0.03
0.014+/-0.001	-0.009+/-0.016	04/21/85	0.02	<0.03
0.015+/-0.001	0.006+/-0.03	04/28/85	<0.01	<0.03
0.130+/-0.004	0.14+/-0.04	05/05/86	0.02	<0.03
0.156+/-0.004	0.12+/-0.04	05/12/86	0.06	0.48
0.082+/-0.003	0.03+/-0.02	05/19/86	0.18	0.21
0.155+/-0.004	0.03+/-0.03	05/27/86	0.14	<0.03
0.029+/-0.002	0.012+/-0.03	06/02/86	0.15	0.04
0.013+/-0.001	-0.002+/-0.03	06/09/86	0.17	<0.08
0.009+/-0.001	0.005+/-0.04	06/16/86	0.03	<0.03
0.008+/-0.001	0.008+/-0.04	06/23/86	0.03	<0.03
		06/30/86	0.02	<0.03

*a - Filter appeared to be clean. Possible low air flow.

Table 10. Air particulate gross beta and air iodine (I-131) results for July - December, 1986. Control site.

WISCONSIN DIVISION OF HEALTH Point Beach SECTION OF RADIATION PROTECTION 1986

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

Point Beach data

Green Bay Pumping Station - Rostok 15.6 miles NNE

Collection date	Air Particulate	Air Iodine
07/11/86	0.012+/-0.001	-0.001+/-0.03
07/18/86	0.008+/-0.001	0.019+/-0.04
07/25/86	0.005+/-0.001	-0.003+/-0.014
08/01/86	0.009+/-0.001	0.04+/-0.03
08/08/86	0.012+/-0.001	-0.004+/-0.04
08/15/86	0.010+/-0.001	0.006+/-0.03
08/22/86	0.012+/-0.001	0.004+/-0.03
08/28/85	0.017+/-0.002	-0.001+/-0.03
09/05/86	0.015+/-0.001	-0.003+/-0.03
09/12/85	0.012+/-0.001	0.002+/-0.019
09/19/86	0.008+/-0.001	0.008+/-0.04
09/26/86	0.009+/-0.001	-0.007+/-0.04
10/03/85	0.010+/-0.001	-0.001+/-0.02
10/10/86	0.008+/-0.001	0.004+/-0.04
10/17/86	0.010+/-0.001	-0.03+/-0.04
10/24/85	0.020+/-0.002	-0.015+/-0.04
10/31/86	0.021+/-0.002	0.000+/-0.05
11/07/86	0.014+/-0.001	-0.06+/-0.03
11/14/85	0.013+/-0.001	-0.03+/-0.03
11/21/86	0.012+/-0.001	-0.007+/-0.02
12/05/86	0.015+/-0.001	-0.012+/-0.02
12/12/86	0.014+/-0.001	-0.005+/-0.03
12/19/86	0.022+/-0.002	0.007+/-0.03
12/26/86	0.020+/-0.002	0.012+/-0.03
01/02/87	0.018+/-0.001	-0.015+/-0.03

Silver Lake College 17 m.les WSW

Collection date	Air Particulate	Air Iodine
07/07/86	0.02+/-0.01	<0.03
07/14/86	0.01+/-0.01	<0.03
07/21/86	<0.01	<0.03
07/28/86	<0.01	<0.0
08/04/86	0.01+/-0.01	<0.0
08/11/86	0.01+/-0.01	<0.0
08/18/86	0.02+/-0.01	<0.0
08/25/86	0.02+/-0.01	<0.0
09/02/86	0.02+/-0.01	<0.0
09/08/86	0.02+/-0.01	<0.03
09/15/86	0.01+/-0.01	<0.03
09/22/86	0.01+/-0.03	<0.03
09/29/86	0.01+/-0.01	<0.03
10/07/86	0.02+/-0.01	<0.03
10/13/86	0.02+/-0.01	<0.03
10/20/86	<0.01	<0.03
10/27/86	0.03+/-0.01	<0.03
11/03/86	0.03+/-0.01	<0.03
11/10/86	0.02+/-0.01	<0.03
11/17/85	0.03+/-0.01	<0.03
11/24/85	0.03+/-0.01	<0.0
12/01/86	0.02+/-0.01	<0.0
12/08/85	0.03+/-0.01	<0.0
12/15/86	0.03+/-0.01	<0.0
12/22/86	0.03+/-0.01	<0.0
12/29/86	0.04+/-0.01	<0.0

Table 11. Gamma isotopic results for January - December, 1986 from the monthly composite of air particulate samples. Indicator site.

WISCONSIN DIVISION OF HEALTH SECTION OF RADIATION PROTECTION

Point Beach 1986

Measurements in units of pCi/M^3

WI - Section of Radiation Protection data

North Property Line 1.3 miles NNW

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	May	June
8e-7	0.071+/-0.010	0.086+/-0.013	0.092+/-0.012	0.062+/-0.010	0.09+/-0.03	0.11+/-0.02
Zr,Nb-95	-0.001+/-0.002	0.002+/-0.002	0.000+/-0.002	0.001+/-0.002	0.002+/-0.004	0.003+/-0.004
Ru-103	0.000+/-0.001	0.015+/-0.002	0.000+/-0.001	0.000+/-0.001	0.028+/-0.004	0.018+/-0.003
Ru-106	0.000+/-0.004	0.004+/-0.005	0.002+/-0.006	0.000+/-0.004	0.009+/-0.015	0.003+/-0.013
I-131	-0.005+/-0.04	0.07+/-0.09	-0.010+/-0.05	0.007+/-0.03	0.024+/-0.016	0.009+/-0.010
Cs-134	0.000+/-0.000	0.005+/-0.001	0.000+/-0.001	0.000+/-0.001	0.012+/-0.002	0.004+/-0.002
Cs-137	0.000+/-0.001	0.011+/-0.001	0.000+/-0.001	0.000+/-0.001	0.027+/-0.003	0.012+/-0.002
Ce-141	0.000+/-0.002	0.002+/-0.002	0.000+/-0.002	0.001+/-0.001	0.000+/-0.003	0.000+/-0.003
Ce-144	0.000+/-0.003	0.000+/-0.003	0.000+/-0.003	0.000+/-0.002	0.005+/-0.007	0.000+/-0.007

Isotopes other than those reported were not detected.

Point Beach data

North Property Line 4 3 -41-- NNH

1.5 81165 888	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Gamma isotopic *	8			
8e-7				
Zr.Nb-95				
Ru-103		0.01		
Ru-106				
1-131				
Cs-134	<0.01	<0.01	<0.01	<0.01
Cs-137	<0.01	0.01	<0.01	<0.01
Ce-141				
Ce-144				

*a - According to Point Beach Radiological Effluent Technical Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

The gamma isotopic analysis is performed on a quarterly composite.



Table 12. Gamma isotopic results for January - December, 1986 from the quarterly composite of air particulate samples. Control site.

WISCONSIN DIVISION OF HEALTH SECTION OF RADIATION PROTECTION Point Beach 1986

Measurements in units of pCi/M*3

WI - Section of Radiation Protection data

Green Bay Pumping Station - Rostok 15.6 miles NNE

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	May	June
80-7	0.062+/-0.011	0.071+/-0.013	0.074+/-0.011	0.058+/-0.010	0.07+/-0.03	0.073+/-0.019
Zr.Nb-95	0.000+/-0.002	0.000+/-0.002	-0.001+/-0.002	0.000+/-0.002	0.000+/-0.005	0.001+/-0.004
Ru-103	0.000+/-0.001	0.013+/-0.002	-0.001+/-0.001	0.000+/-0.001	0.021+/-0.004	0.017+/-0.003
Ru-106	0.000+/-0.004	-0.001+/-0.005	-0.001+/-0.005	0.000+/-0.004	0.009+/-0.017	0.004+/-0.012
1-131	-0.005+/-0.04	0.003+/-0.15	-0.014+/-0.04	-0.009+/-0.03	0.05+/-0.02	0.011+/-0.012
Cs-134	0.000+/-0.000	0.004+/-0.001	0.000+/-0.001	0.000+/-0.001	0.010+/-0.002	0.003+/-0.002
Cs-137	0.000+/-0.000	0.008+/-0.001	0.000+/-0.001	0.000+/-0.001	0.024+/-0.003	0.009+/-0.002
Ce-141	0.000+/-0.002	0.000+/-0.002	-0.001+/-0.002	0.001+/-0.001	0.000+/-0.004	0.000+/-0.003
Ce-144	0.002+/-0.002	0.000+/-0.003	-0.002+/-0.003	0.000+/-0.002	0.000+/-0.008	0.00 +/-0.006

Isotopes other than those reported were not detected.

Point Beach data		Silver Lake College 17 miles WSW					
Gamma Isotopic * a	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter			
8e-7							
Zr.Nb-95							
Ru-103		0.01					
Ru-106							
1-131							
Cs-134	<0.01	<0.01	<0.01	<0.01			
Cs-137	<0.01	0.02	<0.01	<0.01			
Ce-141							
Ce-144							

* a - According to Point Beach Radiological Effluent Technical Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

The gamma isotopic analysis is performed on a quarterly composite.

SECTION OF RADIATION PROTECTION				Po 19	Point Beach 1986		
Measurements in unit	s of pCi/liter						
WI - Section of Radi	ation Protection	data Eff	fluent channel 1 mile E				
Collection Date	January	February	March	April	May	June	
Gross Alpha-sol.	0.9+/-1.2	0.8+/-1.0	-0.4+/-0.8	1.6+/-1.4	0.9+/-1.3	0.7+/-1.1	
Gross Alpha-insol	0.7+/-0.7	-0.1+/-0.4	0.5+/-0.6	0.2+/-0.5	0.2+/-0.7	0.4+/-0.1	
Gross Beta-sol.	4.7+/-1.2	2.9+/-1.2	3.3+/-1.2	4.0+/-1.3	3.1+/-1.3	3.8+/-1.1	
Gross Beta-insol.	1.4+/-1.0	-0.2+/-0.8	0.3+/-0.9	1.3+/-1.0	2.3+/-1.1	1.2+/-1.0	
H-3	4900+/-400	420+/-320	160+/-330	5100+/-400	290+/-310	60+/-32	
Sr-89	0.0+/-0.6	0.2+/-0.5	0.9+/-0.4	0.3+/-0.6	-1.8+/-0.4	-0.8+/-0.1	
Sr-90	0.0+/-0.6	1.3+/-0.5	0.5+/-0.4	0.9+/-0.6	1.1+/-0.4	0.8+/-0.1	
1-131	-0.3+/-0.1	-0.01+/-0.18	-0.05+/-0.07	2.9+/-1.6	2.4+/-0.5	-3.5+/-0.	
Gamma Isotopic							
Mn-54	-1+/-4	-4+/-4	-3+/-4	-2+/-8	-5+/-4	-3+/-!	
Fe-59	1+/-9	-1+/-10	-1+/-12	0+/-22	5+/-12	9+/-1	
Co-58	-1+/-5	0+/-5	-1+/-5	2+/-10	0+/-6	-3+/-	
Co-60	-3+/-5	-2+/-5	1+/-5	-5+/-7	0+/-5	-1+/-	
Zn-65	-4+/-10	-1+/-10	1+/-10	-3+/-19	-2+/-12	2+/-1	
Cs-134	-1+/-6	5+/-5	3+/-5	-3+/-7	-2+/-6	2+/-	
Cs-137	4+/-6	0+/-5	-4+/-5	-2+/-8	-1+/-6	0+/-	
Zr-95	-3+/-12	4+/-13	-1+/-12	-4+/-25	-13+/-13	-4+/-1	
041-4140	1+/-6	-4+/-13	-2+/-7	-6+/-44	-9+/-17	0+/-2	

Isotopes other than those detected were not detected.

Point Beach Data		Efflue 0.1 mi				
Collection Date Gross beta H-3 * a Sr-89 * a	January 2.3	February 1.7	March 3.2 1660 <5	April . 9.0	Мау 2.0	June 3.2 1850 <5
Sr-90 * a I-131	<0.5	<0.5	<1 <0.5	<0.5	<0.5	<1 <0.5
Gamma Isotopic Mn-54	<10	<10	<10	<10	<10	<10
Fe-59 Co-58 Co-60	<30 <10 <10	<30 <10 <10	<30 <10	<30 <10 <10	<30 <10 <10	<30 <10 <10
Zn-65 Cs-134	<30 <10	<30 <10	<30 <10	<30 <10	<30 <10	<30 <10
Cs-137 Zr-95	<10 <15	<10 <15	<10 <15	<10 <15	<10 <15	<10
8a, La-140	<15	<15	<15	<15	<15	<15

* a - The analysis is performed on a quarterly composite.

According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported. Table 14. Analysis of surface water samples from July - December, 1986. Indicator site.

WISCONSIN DIVISION OF HEALTH	Point Beach
SECTION OF RADIATION PROTECTION	1986

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

Effluent channel 0.1 mile E

Collection Date	vľut	August	September	October	November	December
Gross Alpha-sol.	-0.3+/-1.0	0.6+/-1.0	1.1+/-1.1	-0.3+/-1.0	-0.1+/-1.0	-0.5+/-0.9
Gross Alpha-insol	0.1+/-0.7	0.7+/-0.7	0.6+/-0.6	-0.1+/-0.6	0.4+/-0.7	-0.1+/-0.7
Gross Beta-sol.	3.5+/-1.2	3.2+/-1.2	2.8+/-1.2	2.6+/-1.2	4.1+/-1.3	2.4+/-1.2
Gross Beta-insol.	18 3+/-1.9	0.5+/-0.9	2.3+/-1.0	0.1+/-1.0	0.7+/-1.0	0.0+/-0.9
H-3	410+/-320	260+/-330	1160+/-330	170+/-310	19300+/-500	470+/-310
Sr-89	-2.4+/-0.6	-0.3+/-0.4	-0.5+/-0.4	0.06+/-0.3	0.3+/-0.3	-0.2+/-0.5
Sr-90	1.0+/-0.7	0.7+/-0.4	0.9+/-0.4	0.3+/-0.4	0.0+/-0.3	0.9+/-0.4
1-131	3.6+/-0.7	-0.3+/-0.3	-0.3+/-0.1	0.8+/-0.6	0.06+/-0.2	-1.9+/-0.8
Gamma Isotopic						
Mn-54	-2+/-5	-1+/-5	2+/-5	0+/-2	1+/-6	0+/-6
Fe-59	-1+/-13	2+/-11	-2+/-10	-2+/-5	3+/-11	-2+/-13
Co-58	0+/-6	-1+/-5	-1+/-6	0+/-3	-1+/-6	-1+/-7
Co-60	-1+/-5	1+/-5	2+/-6	0+/-2	1+/-6	-1+/-7
Zn-65	1+/-11	1+/-11	3+/-11	1+/-5	-1+/-11	2+/-12
Cs-134	0+/-5	6+/-6	3+/-5	2+/-2	7+/-7	2+/-6
Cs-137	-1+/-6	2*/-8	3+/-6	1+/-3	-1+/-6	1+/-6
Zr-95	6+/-16	7+/-14	0+/-14	-1+/-7	4+/-15	2+/-18
Ba. La-140	-4+/-20	1+/-10	5+/-11	2+/-9	0+/-10	-1+/-30

Isotopes other than those detected were not detected.

Point Beach Data		0.1	mile E			
Collection Date	July	August	September	October	November 2 4+/-0.3	December <0.5
Gross beta	2.0+/-0.6	2.2+/-0.0	<500	1.04/-0.0		6790+/-140
H-3 0			(5			<5
51-09 - 0			<1			<1
1-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Gamma Isotopic						
Mn-54	<10	<10	<10	<10	<10	<10
Fe-59	<30	< 30	<30	<30	<30	< 30
Co-58	<10	<10	<10	<10	<10	<10
Co-60	<10	<10	<10	<10	<10	<10
70-65	<30	<30	<30	<30	<30	< 30
Cs-134	<10	<10	<10	<10	<10	<10
Cs-137	<10	<10	<10	<10	<10	<10
795	<15	<15	<15	<15	<15	<15
Ba.La-140	<15	<15	<15	<15	<15	<15

* a - The analysis is performed on a quarterly composite.

According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported. Table 15. Analysis of surface water samples from January - June, 1985. Control site.

WISCONSIN DIVISION OF HEALTH SECTION OF RADIATION PROTECTION

Point Beach

Measurements in units of pCi/liter

WI - Section of Radiation Protection data Green Bay Pumping 15.6 miles NNE

Collection Date	01/06/86	02/07/86	03/03/86	03/31/86	05/05/86	06/02/86
Gross Alpha-sol.	0.7+/-1.0	0.1+/-0.9	0.9+/-1.0	0.5+/-1.0	0.2+/-0.9	0.0+/-0.9
Gross Alpha-Insol	0.1+/-0.6	0.0+/-0.6	0.6+/-0.6	0.4+/-0.6	0.2+/-0.6	0.4+/-0.7
Gross Beta-sol.	2.4+/-1.1	3.7+/-1.1	3.0+/-1.2	3.2+/-1.2	2.5+/-1.1	2.4+/-1.2
Gross Beta-insol.	0.3+/-0.9	1.8+/-1.0	1.5+/-1.0	1.6+/-1.0	0.8+/-0.9	1.3+/-1.0
H-3	-310+/-320	150+/-300	260+/-320	270+/-330	110+/-320	300+/-310
Sr-89	0.0+/-0.5	-0.4+/-0.5	0.2+/-0.5	0.7+/-0.5	0.4+/-0.3	0.5+/-0.6
Sr-90	0.0+/-0.4	0.3+/-0.5	0.0+/-0.5	0.3+/-0.5	0.4+/-0.3	0.3+/-0.6
1-131	-0.02+/-0.09	-0.03+/-0.07	0.3+/-0.1	0.06+/-0.07	0.4+/-0.1	0.24+/-0.12
Gamma Isotopic						
Mn-54	0+/-5	-3+/-4	-1+/-5	-2+/-5	-1+/-5	-1+/-3
Fe-59	4+/-9	0+/-11	7+/-10	4+/-9	-1+/-9	-1+/-5
Co-58	4+/-5	-2+/-5	-1+/-5	-1+/-4	0+/-5	-2+/-3
Co-60	1+/-5	2+/-5	1+/-5	-2+/-5	.+/-5	0+/-3
Zn-65	12+/-12	-14+/-11	-1+/-10	-2+/-10	-2+/-11	0+/-6
Ca-134	13+/-7	-3+/-5	5+/-5	1+/-5	-1+/-5	-2+/-3
Cs-137	-1+/-5	2+/-5	2+/-6	2+/-6	-2+/-5	0+/-3
Zr-95	-4+/-13	-24+/-14	-4+/-13	-3+/-11	-1+/-12	-7+/-6
8a.La-140	-3+/-6	-5+/-19	-10+/-20	-2+/-5	0+/-6	-1+/-4

Isotopes other than those reported were not detected.

Point Beach data * c		Coas 4.8				
Collection Date	01/05/86	02/03/86	03/03/86	04/01/85	05/05/86	06/02/86
Gross beta	2.4	2.6	3.4	3.5	3.0	2.0
H-3 * b			<500			<500
Sr-89 * b			<5			<5
Sr-90 * b			<1			<1
1-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Gamma Isotopic						
Mn-54	<10	<10	<10	<10	(10	<10
Fe-59	< 30	<30	<30	<30	<30	<30
Co-58	<10	<10	<10	<10	<10	<10
Co-60	<10	<10	<10	<10	<10	<10
70-65	<30	<30	<30	<30	<30	< 30
Ce-134	<10	<10	<10	<10	<10	<10
Ce-137	<10	<10	<10	<10	<10	<10
705	(15	(15	<15	<15	<15	<15
Ra. La-140	<15	<15	<15	<15	<15	<29

* b - Analysis is performed on a quarterly composite.

* c - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

Table 16. A	nalysis of 1986. Cont	rol site.	ater sample	es from Ju	ly - Decemb	er,
WISCONSIN DI	VISION OF	HEALTH		P	oint Beach	
SECTION OF R	ADIATION P	ROTECTION		1	986	
Measurements in unit	ts of pCi/liter					
WI - Section of Rad	iation Protection	data Gre	en Bay Pumping			
		15.	6 miles NNE			
Collection Date	07/02/85	08/04/85	09/03/86	10/01/85	11/04/85	12/04/86
Gross Alpha-sol.	1.3+/-1.4	-0.2+/-0.9	0.7+/-1.0	-0.2+/-0.8	-0.1+/-0.9	-0.2+/-0.9
Gross Alpha-insol	-0.3+/-0.6	0.1+/-0.7	-0.1+/-0.5	0.8+/-0.7	0.6+/-0.7	0 3+/-0 7
Gross Beta-sol.	3.7+/-1.2	2.7+/-1.2	2.2+/-1.2	2.7+/-1.2	3.1+/-1.2	2 3+/-1 2
Gross Beta-insol.	-2.8+/-0.6	8.9+/-1.5	-0.4+/-0.9	1.4+/-1.0	1.0+/-1.0	0.4+/-1.0
H-3	110+/-330	230+/-320	130+/-330	120+/-310	40+/-300	510+/-310
Sr-89	-0.1+/-0.4	-4.5+/-0.7	0.4+/-0.4	-1.0+/-0.4	0.6+/-0.4	0.5+/-0.4
Sr-90	0.6+/-0.3	2.6+/-0.8	0.4+/-0.4	1.1+/-0.4	0.1+/-0.4	0.0+/-0.4
1-131	0.04+/-0.12	0.13+/-0.09	-0.3+/-0.2	0.15+/-0.07	-0.16+/-0.11	0.11+/-0.16
Gamma Isotopic						,
Mn-54	-6+/-7	-1+/-5	1+/-5	-1+/-5	0+/-5	-2+/-5
Fe-59	4+/-14	6+/-11	5+/-11	3+/-9	4+/-10	-2+/-9
Co-58	-2+/-7	-1+/-6	3+/-6	1+/-6	1+/-5	0+/-5
Co-60	-1+/- "	1+/-5	1+/-5	1+/-5	1+/-6	-1+/-6
Zn-65	3+/-16	0+/-10	7+/-12	-3+/-10	5+/-12	5+/-12
Cs-134	-1+/-7	2+/-6	2+/-6	3+/-6	2+/-8	1+/-7
Cs-137	0+/-8	-1+/-5	5+/-6	3+/-6	1+/-6	-4+/-5
Ir-95	-14+/-16	8+/-13	5+/-13	-8+/-12	5+/-13	-2+/-13
Ba, La-140	-3+/-7	-1+/-9	-2+/-7	0+/-6	1+/-7	-2+/-8

Isotopes other than those reported were not detected.

Point Beach data * c	Coast Guard Stati 4.8 miles SSE					
Collection Date Gross beta H-3 * b Sr-89 * b	07/14/86 4.9+/-0.7	08/04/86 3.0+/-0.4	09/02/86 2.0+/-0.3 <500 <5	10/07/86 2.7+/-0.5	11/03/86 3.6+/-0.3	12/01/86 2.0+/-0.4 <500 <5
Sr-90 * b			<1			<1
1-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Gamma Isotopic						
Mn-54	<10	<10	<10	<10	<10	<10
Fe-59	<30	<30	<30	<30	<30	<30
Co-58	<10	<10	<10	<10	<10	<10
Co-60	<10	<10	<10	<10	<10	<10
Zn-65	<30	<30	<30	<30	<30	<30
Cs-134	<10	<10	<10	<10	<10	<10
Cs-137	<10	<10	<10	<10	<10	<10
Zr-95	<15	<15	<15	<15	<15	<15
8a, La-140	<15	<15	<15	<15	<15	<15

* b - Analysis is performed on a quarterly composite.

* c - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported. Table 17. Analysis of fish samples for 1986.

WISCONSIN DIVISION OF HEALTH Point Beach SECTION OF RADIATION PROTECTION 1986

Measurements in units of pCi/kg (wet)

WI - Section of Radiation Protection

Collection Date	05/14/86	05/14/86	06/25/86	06/25/86	09/03/86	09/03/86
Туре	whitefish	trout	brown trout	lake trout	brown trout	salmon
Location	Point Beach					
Gamma Isotopic						
K-40	2800+/-500	2800+/-500	3100+/-400	3300+/-500	3600+/-500	2300+/-400
Mn-54	-13+/-17	-9+/-20	3+/-14	-2+/-16	13+/-19	4+/-15
Fe-59	-2+/-70	-15+/-90	1+/-40	20+/-40	-5+/-50	13+/-40
Co-58	-1+/-30	-2+/-30	15+/-16	7+/-14	7+/-19	10+/-20
Co-60	18+/-30	4+/-30	7+/-20	-1+/-20	30+/-30	15+/-20
70-65	70+/-50	3+/-50	13+/-40	60+/-40	30+/-50	30+/-40
Ca-134	7+/-20	-4+/-20	4+/-13	10+/-15	20+/-20	-3+/-17
Cs-137	60+/-30	80+/-30	110+/-20	100+/-30	150+/-30	90+/-20

Isotopes other than those reported were not detected.

.

Point Beach data *	8					
Collection Date	05/14/85	05/14/86	05/14/86	05/14/86	09/03/86	12/09/86
Туре	whitefish	trout	brown trout	perch	lake trout	trout
Location	Point Beach					
Gamma Isotopic						
K-40				(130	(120	(130
Mn-54	<130	<130	<130	(130	100	130
Fe-59	<260	<260	<260	<490	<260	<200
Co-58	<130	<130	<130	<130	<130	<130
Co-60	<130	<130	<130	<130	<130	<130
70-65	<250	<260	<260	<260	<260	<260
Ca-134	(130	(130	<130	<130	<130	<130
C=-127	(150	<150	<150	260+/-30	170+/-10	<150

b - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported. Table 18. Analysis of fish samples for 1986.

WISCONSIN DIVISION OF HEALTH SECTION OF RADIATION PROTECTION

Point Beach 1986

Measurements in units of pCi/kg (wet)

WI - Section of Radiation Protection

Collection Date	12/10/86	12/10/86
Тура	salmon	trout
Location	Point Beach	Point Beach
Gamma Isotopic		
K-40	2600+/-400	3100+/-500
Mn-54	-1+/-14	-8+/-19
Fe-59	20+/-30	-3+/-50
Co-58	9+/-16	6+/-20
Co-60	6+/-20	6+/-30
In-65	40+/-30	40+/-50
Cs-134	23+/-16	14+/-20
Cs-137	140+/-30	130+/-30

Isotopes other than those reported were not detecte

Point Beach data * a

Collection Date	12/09/86	12/09/86	12/09/86	12/09/86	12/09/86	12/09/86
Туре	trout	salmon	salmon	salmon	trout	trout
Location	Point Beach					
Gamma Isotopic						
K-40						/120
Mn-54	<130	<130	<130	<130	<130	<130
Fa-59	<260	<260	<260	<260	<260	<260
Co-58	<130	<130	<130	<130	<130	<130
Co-60	(130	<130	<130	<130	<130	<130
0-00	(250	(260	<260	<260	<260	<260
LU-00	(130	(100	(130	<130	<130	<130
Cs-134	<130	(130	(150	(160	(150	<150
Ce-137	<150	<150	<150	<150	1100	

* a - According to Point Beach Radiological Effluent Specifications, analysis is onlyradionuclides listed. Radionuclides other than those reported were not detected. Naturally clides are commonly detected but are not reported. Table 19. Analysis of shoreline sediments for 1986.

WISCONSIN DIVISION OF HEALTH SECTION OF RADIATION PROTECTION Point Beach 1986

Measurements in units of pCi/kg (dry)

WI - Section of Radiation Protection data

10/07/86	10/07/86	10/07/86
Shoreline sed.	Shoreline sed.	Shoreline sed.
E-05	E-06	E-12
1.4 miles N	5.3 miles SSE	0.1 mile E
10000+/-4000	14000+/-4000	9000+/-4000
4000+/-6000	11000+/-7000	2000+/-5000
13+/-30	50+/-30	30+/-30
30+/-30	15+/-30	120+/-30
60+/-30	150+/-40	30+/-30
18+/-30	90+/-30	70+/-30
4200+/-400	1000+/-300	5900+/-500
790+/-50	2880+/-150	460+/-40
750+/-80	2560+/-110	380+/-70
720+/-80	2670+/-120	440+/-70
1060+/-90	2420+/-120	290+/-80
1080+/-120	2580+/-150	350+/-100
	10/07/86 Shoreline sed. E-05 1.4 miles N 10000+/-4000 4000+/-6000 13+/-30 30+/-30 60+/-30 18+/-30 4200=/-400 790+/-50 750+/-80 1060+/-90 1080+/-120	10/07/86 10/07/86 Shoreline sed. E-05 E-06 1.4 miles N 5.3 miles SSE 10000+/-4000 14000+/-4000 4000+/-6000 14000+/-4000 13+/-30 50+/-30 30+/-30 15+/-30 60+/-30 150+/-40 18+/-30 90+/-30 4200+/-400 1000+/-300 790+/-50 2880+/-150 750+/-80 2560+/-110 720+/-80 2670+/-120 1080+/-90 2420+/-120 1080+/-120 2580+/-150

*a - Naturally occurring radioisotopes Ac-228 and T1-208 are from the Thorium-232 decay series.
 Ra-226, Pb-214, and Bi-214 are from the Uranium-238 decay series.
 Isotopes other than those reported were not detected.

Point Seach data * b

Collection Date	10/07/86 Shoreline sed.	10/07/86 Shoreline sed.	10/07/85 Shoreline sed.
Location	E-05 1.4 miles N	E-06 5.3 miles SSE	E-12 0.1 mile E
Analysis			
Gross beta (dry) Gross alpha (dry) Gamma Isotopic Co-58 Co-60	5700+/-2600	20300+/-3600	8700+/-3000
Cs-134	(150	<150	<150
K-40			

* b - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported. Table 20. Analysis of milk samples for January - December, 1986. Funk farm.

WISCONSIN DIVISION OF HEALTH SECTION OF RADIATION PROTECTION

Point Beach 1986

Measurements in uni	ts of pCi/liter	Fur	k farm			
WI - Section of Rad	liation Protection	data	miles mon			
Collection date	01/08/86	02/05/86	03/12/86	04/02/86	05/14/86	06/05/86
Isotope:	0 58+/-0 11	0 23+/-0.09	0.60+/-0.09	0.07+/-0.11	-0.07+/-0.09	-0.17+/-0.08
1-131 Ra 1 a-140	-3+/-6	1+/-5	-3+/-6	-1+/-7	-2+/-7	-3+/-5
Ce-134	-1+/-7	4+/-7	4+/-5	4+/-6	-2+/-7	-2+/-6
Ce-137	5+/-6	0+/-7	5+/-6	7+/-6	9+/-7	-1+/-6
K-40	1370+/-180	1300+/-170	1300+/-170	1410+/-180	1600+/-190	1390+/-180
Sr-90	1.9+/-0.6	1.4+/-0.6	2.0+/-0.7	1.3+/-0.5	2.0+/-0.7	1.8+/-0.5
Collection date	07/09/85	08/06/86	09/03/86	10/08/86	11/05/86	12/03/86
Isotope:	-0 21+/-0 15	-0 09+/-0 09	-0.12+/-0.11	0.01+/-0.06	0.12+/-0.10	0.12+/-0.06
1-131	-0.214/-0.10	0+/-6	0+/-7	-2+/-5	4+/-10	-1+/-5
00,L0-140	1+/-6	-1+/-7	14+/-7	11+/-7	7+/-8	-1+/-8
Ce-132	10+/-7	-1+/-7	9+/-7	-1+/-8	7+/-10	5+/-8
V-40	1940+/-170	1530+/-190	1340+/-180	1370+/-180	1500+/-200	1330+/-180
S=_00	1 6+/-0 7	4 1+/-0 3	2.4+/-0.6	1.2+/-0.6	3+/-2	1.8+/-1.0

Isotopes other than those reported were not detected.

Point Beach data		Funk farm 3.8 miles WSW						
Collection date	01/08/86	02/05/86	03/12/86	04/02/85	05/14/88	06/04/85		
Isotope:								
1-131	<0.5	<0.5	<0.5	<0.5	0.6	<0.6		
Ba.La-140	<5	<5	<5	<5	<5	<5		
Ce-134	(5	<5	<5	<5	<5	<5		
Ce-137	(5	<5	<5	<5	<5	<5		
K-40	NA	NA	NA	NA	NA	NA		
Sn-80	<5	<5	<5	<5	<5	<5		
Sr-90	1.4	2.3	1.6	1.8	1.4	1.0		
Collection date	07/09/86	08/06/86	09/03/86	10/08/86	11/05/86	12/03/86		
lsotope:			10.5	(0.5	<0.5	<0.5		
1-131	<0.5	(0.5	10.0	15	(5	<5		
8a, La-140	<5	<5	(0	15	15	(5		
Cs-134	<5	<5	<5	(0		/5		
Cs-137	<5	<5	<5	<5	()			
K-40	NA	NA	NA	NA	NA			
5	<5	<5	<5	<5	<5	<5		
590	1.9+/-0.6	1.7+/-0.4	2.1+/-0.6	1.6+/-0.4	1.6+/-0.5	1.9+/-0.5		

NA - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported. Table 21. Analysis of milk samples for January - December, 1986. Lehrmann farm.

WISCONSIN DI SECTION OF F	IVISION OF RADIATION P	Point Beach 1986				
Measurements in uni	ts of pCi/liter	Let 2.1	nrmann farm 1 miles NNW			
WI - Section of Rad	liation Protection	data				
Collection date Isotope:	01/08/86	02/05/86	03/12/86	04/02/86	05/08/86	06/05/86
1-131	0.19+/-0.09	-0.03+/-0.12	0.29+/-0.08	-0.15+/-0.09	0.22+/-0.09	22+/-8
Ba, La-140	-4+/-5	0+/-5	-14+/-8	-1+/-6	-5+/-5	-1+/-5
Cs-13!	5+/-6	3+/-6	1+/-8	4+/-6	-1+/-6	-1+/-7
Cs-137	0+/-7	4+/-7	3+/-10	5+/-6	-1+/-7	9+/-6
K-40	1490+/-180	1310+/-170	1500+/-200	1250+/-170	1340+/-180	1410+/-180
Sr-90	2.5+/-0.5	2.7+/-0.6	2.9+/-0.7	2.5+/-0.8	2.3+/-0.7	3.0+/-0.6
Collection date Isotope:	07/09/86	08/06/85	09/03/86	10/08/86	11/05/86	12/03/86
1-131	0.29+/-0.16	0.03+/-0.08	-0.03+/-0.12	-0.06+/-0.07	0.01+/-0.10	0.02+/-0.05
Ba, La-140	1+/-6	1+/-7	2+/-7	1+/-6	1+/-7	4+/-7
Cs-134	0+/-6	1+/-9	3+/-7	1+/-7	7+/-7	4+/-7
Cs-137	1+/-7	-1+/-9	-1+/-9	6+/-6	3+/-7	10+/-7
K-40	1310+/-180	1350+/-190	1260+/-190	1580+/-190	1400+/-180	1510+/-190
Sr-90	2.8+/-0.6	2.9+/-0.6	2.9+/-0.7	2.5+/-0.6	2.4+/-0.5	2.8+/-0.8

Isotopes other than those reported were not detected.

Point Beach data		Lehrn 2.7 m	mann farm miles NNW			
Collection date	01/08/86	02/05/86	03/12/85	04/02/86	05/19/86	06/05/86
Isotope:						
I-131	<0.5	<0.5	<0.5	<0.5	2.1	21.4
8a.La-140	<5	<5	<5	<5	<6	< 9
Cs-134	<5	<5	<5	<5	<5	<5
Cs-137	<5	<5	<5	<5	<5	5.2
K-40	NA	NA	NA	NA	NA	NA
Sr-89	<5	<5	<5	<5	<5	<5
Sr-90	2.8	3.4	2.2	2.7	2.3	1.9
Collection date	07/09/86	08/06/86	09/03/86	10/08/85	11/05/86	12/03/86
Isotope:	/0 E	/0 S	(0.5	<0.5	<0.5	<0.5
1-131	10.5	10.5	15	(5	(5	<5
8a, La-140	(0	10			15	15
Cs-134	<5	<5	(5	()		
Cs-137	<5	<5	<5	<5	<5	<5
K-40	NA	NA	NA	NA	NA	NA
Sr-89	<5	<5	<5	<5	<5	<5
Sr-90	2.0+/-0.5	3.7+/-0.7	2.6+/-0.5	2.2+/-0.5	3.1+/-0.6	2.4+/-0.6

NA - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported. Table 22. Analysis of food product samples for 1986.

WISCONSIN DIVISION OF HEALTH SECTION OF RADIATION PROTECTION

Point Beach 1986

Measurements in units of pCi/kilogram (wet)

WI - Section of Radiation Protection data

Collection Date	10/07/86	10/07/86	10/07/85	10/07/86
Туре	vegetation	vegetation	vegetation	vegetation
Location	E-02	E-03	E-04	E-06
	0.7 miles SSW	0.8 miles WNW	1.0 miles NNW	5.3 miles SSE
Analysis				
Gross beta (wet)	6900+/-1400	8200+/-1400	9400+/-1600	7600+/-1700
Gross alpha (wet)	-200+/-1300	700+/-1400	600+/-1600	0+/-1600
Gamma Isotopic				• /
8e-7	2800+/-300	2600+/-170	4200+/-300	5600+/-200
K-40	5400+/-500	7000+/-400	5800+/-500	4700+/-300
Co-58	-17+/-30	-5+/-14	-9+/-30	4+/-13
Co-60	-100+/-40	6+/-19	-80+/-40	4+/-15
Zr-95	-14+/-70	-4+/-30	-20+/-70	-1+/-30
I-131	-19+/-40	-2+/-20	-1+/-40	4+/-18
Cs-134	-10+/-30	-6+/-14	-9+/-30	24+/-13
Cs-137	-13+/-30	2+/-15	11+/-30	145+/-18

Isotopes other than those reported were not detected.

Point Beach data * a

Collection Date Type Location	10/07/86 vegetation E-02 0.7 miles SSM	10/07/85 vegetation E-03 0.8 miles WNW	10/07/86 vegetation E-04 1.0 miles NNW	10/07/86 vegetation E-06 5.3 miles SSE
Analysis				
Gross beta (wet) Gross alpha (wet) Gamma Isotopic Be-7	5900+/-200	7400+/-500	7400+/-300	7000+/-300
K-40				
Co-58				
Co-60				
Zr-95				
1-131	<60	<60	<60	<60
Cs-134	< 60	<60	<60	<60
Cs-137	<80	<80	<80	190+/-50

RAM?)

* a - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.